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SYSTEMS UNDER DEVELOPMENT FOR VOCATIONAL GUIDANCE, A REPORT
OF A RESEARCH EXCHANGE CONFERENCE (OHIO STATE UNIVERSITY,
AUGUST 18-19, 1966).

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INFORMATION RETRIEVAL, *EXPERIMENTAL PROGRAMS, RESEARCH,
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PURPOSES OF THE CONFERENCE WERE TO (1) REVIEW
EXPERIENCES, PROBLEMS, AND INSIGHTS DEVELOPED BY THE
INDIVIDUAL PARTICIPANTS THROUGH RESEARCH AND OPERATIONAL USE
OF NEW TECHNOLOGIES, (2) REVIEW THE RELATION OF THESE
TECHNOLOGIES TO VOCATIONAL EDUCATION, VOCATIONAL COUNSELING,
AND GUIDANCE, AND (3) ARRANGE FOR CONTINUED COMMUNICATION
AMONG PARTICIPANTS AS THEY USE SYSTEMS ANALYSIS AND
TECHNOLOGY IN VOCATIONAL GUIDANCE RESEARCH AND PRACTICE.
THREE AREAS WERE DISCUSSED--(1) PROJECTS DEVOTED TO THE STUDY
OF CAREERS, (2) PROJECTS FOR THE DEVELOPMENT AND PRESENTATION
OF MATERIAL FOR THE ENHANCEMENT OF CAREER DECISIONS BUT NOT
INVOLVING THE COMPUTER, AND (3) PROJECTS DEVOTED TO THE
DEVELOPMENT OF MATERIAL AND THE PRESENTATION AND ASSESSMENT
OF PRESENTATION WITH THE ASSISTANCE OF TIME-SHARED COMPUTERS.
SUMMARIES ARE GIVEN FOR (1) PROJECT TALENT, (2) EXPLORATORY
STUDY OF INFORMATION PROCESSING PROCEDURES AND COMPUTER-BASED
TECHNOLOGY IN VOCATIONAL COUNSELING, (3) A
HARVARD-NEEDS-NEWTON INFORMATION SYSTEM FOR VOCATIONAL
DECISIONS, (4) A STUDY OF INTELLECTUAL GROWTH AND VOCATIONAL
DEVELOPMENT, (5) THE DEVELOPMENT AND EVALUATION OF A PILOT
COMPUTER-ASSISTED VOCATIONAL GUIDANCE PROGRAM, (6) CLEAR
LANGUAGE PRINTOUT OF DEMOGRAPHIC AND PSYCHOMETRIC DATA
REGARDING COLLEGE STUDENTS, (7) A MULTIMEDIA APPROACH FOR
COMMUNICATING OCCUPATIONAL INFORMATION TO NONCOLLEGE YOUTH,
(8) VOCATIONAL ORIENTATION SYSTEMS, AND FIVE OTHER PROJECTS.
(EM)

Systems Under Development for Vocational Guidance

ED011039

A Report of A Research Exchange Conference

August 18 -- 19, 1966

**The Center for Vocational and Technical Education
The Ohio State University · 980 Kinnear Road · Columbus, Ohio**

VT 01281

The Center for Vocational and Technical Education has been established as an independent unit on The Ohio State University campus with a grant from the Division of Adult and Vocational Research, U. S. Office of Education. It serves a catalytic role in establishing a consortium to focus on relevant problems in vocational and technical education. The Center is comprehensive in its commitment and responsibility, multidisciplinary in its approach, and interinstitutional in its program.

The major objectives of The Center follow:

1. To provide continuing reappraisal of the role and function of vocational and technical education in our democratic society;
2. To stimulate and strengthen state, regional, and national programs of applied research and development directed toward the solution of pressing problems in vocational and technical education;
3. To encourage the development of research to improve vocational and technical education in institutions of higher education and other appropriate settings;
4. To conduct research studies directed toward the development of new knowledge and new applications of existing knowledge in vocational and technical education;
5. To upgrade vocational education leadership (state supervisors, teacher educators, research specialists, and others) through an advanced study and in-service education program;
6. To provide a national information retrieval, storage, and dissemination system for vocational and technical education linked with the Educational Research Information Center located in the U. S. Office of Education;
7. To provide educational opportunities for individuals contemplating foreign assignments and for leaders from other countries responsible for leadership in vocational and technical education.

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SYSTEMS UNDER DEVELOPMENT FOR VOCATIONAL GUIDANCE

A Report of a Research Exchange Conference

August 18 and 19, 1966

held at

The Ohio State University, Columbus, Ohio

Edited by

Robert E. Campbell, The Ohio State University

David V. Tiedeman, Harvard University

Ann M. Martin, University of Pittsburgh

The Conference was sponsored by The Center for Vocational and Technical
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TION & WELFARE.

Preface

In keeping with its catalytic role, The Center was pleased to sponsor the Research Exchange Conference on Systems Under Development for Vocational Guidance. Broadly speaking, the conference was a unique experiment in research stimulation and coordination. It provided an opportunity for independent researchers concerned with mutual problems to exchange ideas for methodologies and to reinforce each other's efforts. Traditionally, the research exchange time lag has been lengthy and has been a hindrance to the sequential investigation of major problems. In addition to facilitating research, the conference expedited the diffusion of guidance innovations by reporting research in progress, thereby, communicating future trends.

Dr. Robert E. Campbell, Occupational Psychologist at The Center, and Dr. Ann M. Martin, Project Director, Multi-media Approach to Communicating Occupational Information to Non-College Youth, University of Pittsburgh, are to be commended for their work as conference coordinators. Special thanks is due Dr. David V. Tiedeman, Professor of Education, Harvard University, for his role as program chairman. The Center is also indebted to the conference participants for their presentations, reactions, and contributions during the two-day meeting.

Robert E. Taylor
Director,
The Center for Vocational and
Technical Education

CONFERENCE OBJECTIVES

In recent years, several new technologies and methods have been developed in the field of information processing for career decision-making purposes. These advances can best be characterized as follows:

1. Computer-assisted counseling systems
2. Gaming techniques
3. Use of communications media

Computer assisted counseling systems combine systems analysis of the counseling process with measurement systems for determining which information should be provided to a particular student at a given sequence in the program. The computer allows the handling of a greater amount of information about individual students thus increasing the potential of understanding how human individuals make decisions.

Gaming techniques (e.g., the Life Career Game designed by Sarane Boocock at John Hopkins University) have introduced the possibility of developing career potentials among students through practice sessions in simulated decision-making situations. In these games students get at what values and what life patterns are inherent in the choices they make.

Communications media (e.g., TV, AV, audio tape, etc.) provide a core around which to build in providing students, parents and counselors with a selective view of changing concepts of work, education and self. These concepts are then available to those who have choices to make in relation to education and work. The purposes of the conference were:

1. To review experiences, problems and insights, developed by the individual participants through research and operational use of these new technologies.

2. To review the relation of these technologies to vocational education, vocational counseling and guidance.
3. To arrange for continued communication among participants as they bring to bear systems analysis and technology in vocational guidance research and practice.

Ann M. Martin

Robert E. Campbell

Conference Coordinators

David V. Tiedeman

Program Chairman

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CONFERENCE SUMMARY

A small group of researchers met informally for two days to share mutual problems and ideas in the development of new technologies and innovations for vocational guidance. Prior to the conference, each investigator had been operating reasonably independently in the development of his System project. Although, there was considerable substantive communality, among the various research projects each project is distinct in its goals, methods, techniques, and theoretical disposition. All projects have the common goal of eventually assisting persons to become more effective in their educational and occupational planning, but each project varies in magnitude and developmental stages in relation to this goal.

The projects under discussion fell into three areas: (1) projects devoted to the study of careers per se; (2) projects for the development and presentation of material for the enhancement of career decisions but without involving the computer in presentation and materials; and (3) projects devoted to both the development of material and the presentation and assessment of presentation with the assistance of time-shared computers.

Conference participants were in general agreement that exchange during the conference was excellent. There was sincere willingness for mutual exploration of problems and reciprocal assistance. Furthermore, there was consensus that continued communication should occur in a second conference which is tentatively planned for mid-winter. The first meeting merely served to identify major issues, initiate communication, and establish future foci. Therefore, in the next conference, the investigators would like to pursue questions of substance in more depth.

The notion of Systems Development proved to be the theme of the conference which participants wish to explore further. Systems for guidance-like activities which are now in development include those for:

1. Assisting the individual in self evaluation and educational-vocational exploration.
2. Assisting with counselor activities, especially routine tasks and data storage.
3. Assisting in describing the world of work in its many facets and complexities.

The above three guidance systems are largely modeled on existing guidance activities. There is agreement among conference participants that guidance Systems can be constructed to substitute effectively for the clerical activities now undertaken by the guidance counselor. However, there is a larger issue presently facing conference participants. A time-shared computing System permits the user to obtain educational and vocational facts in unique ways. It is now possible to construct data bases, and to provide computer routines which will permit both user access in several modes of thought development, and monitoring of use. The routines are designed to help the user learn how he has decided as well as how to decide. The substantive issues facing participants therefore, concern means whereby the above can be done in efficient manners. These are issues which the participants wish to frame in subsequent meetings.

Because time-shared computers now make the above interactions possible, the participants felt that they "just scratched the surface" in identifying and discussing problems and issues in systems research in guidance. However, the following list represents concerns in implementing the System which are now evident to the participants.

Model of Counselor Functioning:

In establishing an experimental System, one of the first problems is to design the basic model of counselor activities to be performed by the System. The investigator is immediately faced with the question of which theoretical representation of counselor functioning should be employed as an operational framework for the establishment of a System. As the building of the System progresses, theoretical decisions have to be met, e.g., how people make vocational choices, the role of diagnosis, amount of self direction, etc. In building a model, does the researcher operationally simulate observed counselor activities; or does he develop a new model?

It should be stressed that no System intends to replace or eliminate the counselor; a System should be perceived as an aid or tool for the counselor. A System can be extremely helpful in handling routine tasks (storing occupational and educational information, demographic data, academic performance, etc.) Hence, the goal in most Systems is to free the counselor from routine tasks in order to provide more time for adequate work with more complex problems.

All of the participants were concerned about the accusation that the computers are de-humanizing or ultimately replacing counselors. This is far from the truth; the attitude is that a System is a tool like other tools frequently used, e.g., group testing or occupational films. As one participant put it, "Any counselor the machine replaces, wasn't a counselor in the first place."

The counselor is never excluded from a System. Systems are programmed in such a way as to allow for frequent counselor intervention and monitoring. The counselor can thereby intervene at any point which he deems appropriate for assisting the client. The client has the same option in transferring from the System to the counselor.

In developing a model, the participants were concerned about such things as the use of natural language on the computer print-outs, student expectancies and attitudes, "hardware" limitations imposed upon the model and goals of the model. Many of these concerns are discussed in more detail in subsequent sections.

Data Base Construction:

This topic deals primarily with the input for a System, e.g., what kinds of information will a System need in order to accomplish its goals? The input data will vary as a function of the goals of the System, but typically occupational information, educational information, demographic data, test results, school characteristics, and academic records of the student are included. Most Systems also allow for student input, i.e., the storage of personal data which are directly supplied by the student as he interacts with the System. In addition to selecting the general major categories of the data input, the investigator has a number of decisions to make in regard to organization of the data, the quantity of data, mode of presentation, etc. For example, in providing information about vocational training opportunities, how should these be grouped, how much detail should be included, and at what points within a System's sequence should the material be introduced? What data bases should be provided besides the educational data base? Occupational? Military? Marriage? Leisure? How can you provide access linkage so that movement from base to base is possible? How can you monitor access and interpretation so that a history of use is provided and a sense of increased complexity in thought and action plan ensues in conjunction with use? How can you simulate "career" so that a sense of progress and of operation for progress can be provided for the user?

Battery of Measurement Instruments:

The inclusion of test results as a type of input variable presents some problems for Systems researchers - not only problems of quantity and quality, but also problems of test interpretation and testing procedures. For example, what kinds of information should be obtained through tests and which tests are most appropriate to measure the appropriate traits? Should the System be designed to do the actual testing or should the testing be done independently of the System? Similar questions are asked in regard to test interpretation. Can Systems be designed with enough flexibility to handle the complexities of test interpretation not only for singular tests but tests in combination.

In selecting tests the System developer also has to consider the physical capacity of the computer. The System may be limited by the amount of data it can effectively handle in a sufficiently small interval of time. Perhaps this is an instance where the counselor must intervene in cooperation with the System. The researcher has a number of alternatives for handling test data and he will probably experiment with different approaches while attending to "feed-back" from the client.

Taxonomy of Occupations and Descriptions:

This is basically a problem of how to classify and present educational and occupational information, e.g., nature of training, requirements for admission, job opportunities, etc. One of the major advantages to the student using a computer System in making an occupational choice is that the System, if properly programmed, can allow a wide spectrum of occupational exploration. For example, if a System is ideally designed, the System can help the student in moving from one occupation to another within a family of occupations, across levels of occupations, and through career progressions.

To provide this exploration, a complex well-organized occupational classification system is needed - one in which the student can explore on the basis of one or more occupational attribute (skill requirements, income, etc.) For example, the student might very well ask the System, "I have these given traits, what occupations are available to me?" Or, "With a given set of traits, what additional traits would I need to enter this or that occupation?" There are also problems relating to storing local, geographic and national trends and the continual difficulty of maintaining up-to-date information.

After a taxonomy of occupations has been developed, there are questions which pertain to the kind of media for presenting this occupational information.

An elaborate System might incorporate film strips, audio tapes, slides, and other innovative techniques. A System must also include points at which the student can temporarily interrupt his interaction with the computer and use other modes of obtaining occupational information, e.g., group counseling, work experience, on-the-job visits, etc.

Computer Technologies Development:

Implementing an effective vocational guidance System requires fairly elaborate computer equipment or "hardware". As the System is experimentally shaped and evaluated for its effectiveness, modifications of standard equipment and the design of new equipment becomes mandatory. One of the major benefits of a research exchange conference is to provide the sharing of information, particularly on equipment. The individual participants reported their success with different kinds of equipment outlining equipment capacities and limitations. Due to the rapid advances in computer technology across different fields of study, it is a major task for the individual researcher

to stay abreast of developments. It was recommended that perhaps an inventory of Systems equipment be maintained as a reference base. It was also noted that new kinds of hardware will soon become available. This new hardware will originally be available merely for research until materials and programs (the "software") make large scale operation possible. At this time, signs are that "computer utilities" may well come into being. Such "utilities" could in turn make feasible the possible. Large scale operation on the order of a "utility" will undoubtedly be needed in order to make widespread the use of computer-based guidance Systems.

Presentation Techniques:

The mode of presentation of information to the client as he interacts with the System represents another choice for the investigator. At present several presentation alternatives are available for research: type-written printouts, films, slides, and audio recordings. Combinations or sequences of presentations are now also possible for programming consideration. Discovery of reasonably optimum presentation modes for different kinds of data and tasks (occupational information, educational information, test results, problem solving, and decision making) is now urgently needed. The general trend is toward combining different modes of presentation which could especially incorporate natural language and thereby permit adaptation of the System by the user himself.

Analysis of the World of Work:

Analysis of the world of work differs from merely providing "a taxonomy of occupations and descriptions." The researcher is concerned with a more comprehensive analysis of the world of work. Two major questions emerge: (1) How should the world of work be described and presented? (2) How much information does the student need about the world of work to make sound

vocational choices?

An effective analysis draws upon a vast range of inter-disciplinary data, e.g., sociological correlates, labor economics, career progressions, style of life, etc. Analysis therefore requires movement toward integration of research from the fields of economics, psychology, sociology, education, and anthropology. As integration proceeds on a time-shared computer System, it could provide a more personal analysis for the individual as he attempts to relate himself to the world of work. The System could conceivably pose thought-provoking, longitudinal career questions of the occupational neophyte. It could also allow the student to look more carefully at the series of choice points involved in the world of work as opposed to a singular occupational choice. As the student interacts with the System, the investigator can obtain valuable information from the student which might pose problems for further research. The student also has an opportunity to test his knowledge and perceptions of the world of work as contrasted with the actual reality of work.

Research Study:

As one can see, continued research effort is needed to provide data for implementation and continued refinement of a System. Longitudinal and cross sectional studies on occupations, the decision making process, the process of learning, career behavior, measurement instruments, counselor behavior, etc. are critical in providing data bases for developing a System. This is a two-way street in which findings from various research studies can be tried out on a System. The System in its turn can identify researchable gaps and problems for further research study.

Clarification of the Monitoring Role:

As the student interacts with a System, there are numerous occasions

for intervention (monitoring) by the counselor, teacher, and/or other relevant person. There is no set rule as to when monitoring should occur; monitoring will vary with the individual System programming design. Most Systems incorporate intervention points frequently so that the monitor or the student can "go off" the System as the need arises. Typically this will occur when their problems become highly personal, when "hangups" occur, where referral to other resources is needed and/or where the student appears not to be ready to continue interacting with the System. When the student transfers from the computer to the counselor, the counselor can have benefit of the student's previous interactional record.

The procedure of monitoring should again remind us that a System is a tool under control of counselor and student. However, in developing a System, clarification will certainly be needed as to the frequency, the amount, and the kind of monitoring.

Subjects and settings:

Although it is generally assumed that Systems are being developed for persons in need of vocational guidance, considerable variation exists within this population, e.g., age, educational level, and vocational readiness. A senior in college may want different kinds of information than a junior high school student contemplating a vocational education program. There are also variations in the vocational guidance setting, e.g., Youth Opportunity Center, college, or United States Employment Service. Differences in subjects and settings greatly influence the input and programming sequence. Although the basic model could be essentially the same, changes would have to be made to account for the specific population. Most researchers envision flexibility in their models so that the basic model can be easily altered to adapt to other subjects and settings.

Other questions related to this issue are the physical location of a System, joint sharing of the physical equipment, educating cooperating personnel, criteria for the selection of System users, the work tolerance of the individual as he uses a System, and cost analysis of a System.

Some of the questions in the foregoing paragraph are not mutually exclusive. For example, the problems of physical location, time-sharing, and cost analysis of a System can be interdependent. If a school system wanted to use a System but found the cost prohibitive, alternatives such as sharing the equipment with other school systems, using the equipment for other school services (bookkeeping, grading, scheduling,) and as a research tool greatly reduce the per capita cost.

Educating cooperating school personnel in implementing a System is critical if a System is to work. Some Systems include this phase as part of the experimental model, i.e., indoctrinating school personnel for acceptance, educational benefits, and their role in the System. Others do not. However, whatever their present project, participants agree that marked change in counselor education will become critical as time-shared computer Systems become available in education and vocational guidance.

PROJECT SUMMARIES

PROJECT SUMMARY

Title: Exploratory Study of Information Processing Procedures and Computer-Based Technology in Vocational Counseling

Principal Investigator: J. F. Cogswell

Institution: System Development Corporation, Santa Monica,
California

Funding Agency: Division of Adult and Vocational Research, USOE

Duration: Phase 1 -- 18 months. December 1965 - May 1967
Phase 2 -- 2 years

Objectives: The objectives of the study are: (1) to survey and report counseling and related information-processing practices in the vocational education field; (2) to explore ways in which information-processing technology can be applied to aid the counselor by relieving him of certain routine information-processing functions and by providing him with additional information on which to base his decisions; and (3) to develop and evaluate an experimental computer-based man-machine counseling system.

Procedures: At a very general level of discourse procedures being employed are as follows:

A. Survey of Vocational Guidance Operations in the Field

Counseling procedures and information-processing practice will be surveyed in twelve vocational education installations. Three of each of the following types will be included: junior colleges having at least 50 % of their students in terminal programs,

vocational training schools, vocational high schools, and Job Corps training centers. In addition, two state employment agencies and one private and one municipal vocational guidance operation will be studied. One of these installations will be selected as the experimental site.

B. Detailed Analysis of the Counseling Procedures Employed at Experimental Field Site

The procedures at the experimental field site will be analyzed by the following procedure: The flow of students will be described through all of the steps in the counseling process from the time of initial application and/or entrance to the final interview, decisions, and actions. The procedures employed by each counselor will be described.

C. Design and Development of the Computer-Based Information-Processing Functions

The planning team will review the survey data and the detailed data collected at the experimental site. It will decide which functions should be developed as computer-based information-processing procedures and how these procedures should be used in operation.

Although the specific computer-based function to be developed will depend upon the design formulated by the planning team, the following functions might be incorporated in the final design:

- (1) A student-information data base
- (2) An information retrieval system
- (3) A system for monitoring student performance
- (4) A counseling appraisal function
- (5) An automated interview function

D. Evaluation of the Modified Counseling System

The evaluation will be concerned with the following variables:

- (1) the attitudes of students and staff toward the automated procedures;
- (2) the ways in which counselors use their time;
- (3) the number of students who drop out of training;
- (4) the maturity of the counselees' vocational plans;
- (5) the training effects of communicating to counselors, well-explicated models of their counseling procedures; and
- (6) the relevance of the questions that students ask of the machine to their own personal problems.

The measures will be partially developed during the six-month survey period, and will be refined for use during the first two months immediately following the selection of the experimental site.

Current status: All survey data has been collected. It is being analyzed.

The counseling operations in a local high school and junior high school have been selected as the focal system for study. The counselors have been trained in computer applications and have participated in the initial design formulation. Analysis of the counseling operations demonstrate that counselors do not have time to see all of their students, counselors spend a large amount of time in processing data that could be handled much more efficiently by machine, and the counseling operation is decidedly weak in providing vocational guidance. Design ideas under consideration to date are as follows: storage of all student curricular and post high school educational data in the computer for ready processing and retrieval; tracking and monitoring of

student progress to identify students in need of counseling; on-line generation and application of multiple regression formulae for prediction and research; automated report preparation; and automated interviews in course programming, post high school educational planning, and vocational guidance.

In addition, plans are progressing toward using the computer to bring auxiliary counseling services into the school.

Discussions with the California State Employment Service are in progress for building an automated vocational guidance interview for the high school, and plans to store in the computer and make available to counselors and students. The Los Angeles Vocational Advisement Service's occupational information is under consideration.

PROJECT SUMMARY

Title: Project TALENT

Principal Investigator: John C. Flanagan and William W. Cooley

Institution: University of Pittsburgh and American Institutes
for Research

Funding Agency: U. S. Office of Education

Duration: 1957 to 1984

Objectives: To conduct follow-up studies of a large, representative sample of American high school students tested in 1960 for the ultimate purpose of improving high school guidance.

Procedures: Develop a computer-measurement system for guidance which utilizes Project TALENT results.

IMPLICATIONS FOR GUIDANCE

The great number of career plan changes that take place during and immediately following high school suggest that plans formed in high school are unrealistic for one reason or another. This is an unfortunate phenomenon since educational decisions made during and immediately following high school are based upon these unrealistic (or at least unstable) plans.

There is really no concern if a boy changes his career goal from physics to mathematics between grade 10 and grade 12 because the high-school preparation of future physicists and future mathematicians is similar. On the other hand, if a tenth-grade boy planning to go into business later decides in the twelfth grade to become an astronautical engineer, he will be rather set back if he has not taken the necessary mathematics options during high school.

These practical guidance considerations are based on the following principles: (1) there is no single high-school curriculum appropriate for all students, (2) the appropriateness of a curriculum depends in part upon career plans of the student, (3) different career plans are appropriate for different students, and (4) the appropriateness of a career plan depends upon the abilities and motives of the student and the projected supply and demand characteristics of the job market.

Because of the number of students to be served and the volume of information to be processed, at least partial automation of school guidance services is necessary if these principles are to be followed. One computer measurement system of guidance has already been proposed by William W. Cooley (see recent Project TALENT published articles). A major function of this system would be to give each student a good projection of his possible vocational future. Project TALENT would be useful in the development of such a system. First of all, the results of the follow-up studies described earlier have provided evidence of the predictive validity of the TALENT variables for membership in various post-high-school occupational, educational, and career-plan groups. A measurement system using these data could, for example, take a boy's test scores and return to him the probability of future membership in each of the six occupational categories discussed earlier. These probabilities would sum to one. A particular boy might get this set of probabilities:

1. Physical Science - .70
2. Medicine - Biology - .03
3. Humanities - .02
4. Business College - .04
5. Technical - .20

6. Business Noncollege - .01

This information does not tell the boy that he must become a physical scientist. It informs him that in a group of boys who share his measured characteristics, one year out of high school most plan to be physical scientists, some intend to be technicians, and very few plan careers in the other four areas. He is not forced to react in any particular way, but he may choose to incorporate the information into his planning for his future.

Project TALENT can also aid in the development of a computerized system of guidance by providing a model for future career follow-ups. These follow-ups could be carried out by local school districts or by a central agency established by the Office of Education. Information obtained through these studies could then be systematically given to all local guidance programs

Other TALENT contributions to a computer measurement system will include:

- (1) the phrasing of a comprehensive, coherent trait-and-factor theory of adolescent personality
- (2) the delineation of a measurement system related to that theory
- (3) the packaging of computer programs for the data processing and analytical operations of a school measurement system
- (4) an effort through content analysis of school courses, achievement tests, and vocational positions to synthesize the common element of curriculum and guidance sciences.

PROJECT SUMMARY

Title: A Harvard-Needs-Newton Information System For Vocational Decisions

Principal Investigator: Russel G. Davis, Allan B. Ellis,
Wallace J. Fletcher, Edward Landy,
Robert P. O'Hara (Executive Director),
David V. Tiedeman, (Chairman, Executive Committee),
and Michael J. Wilson.

Institutions: Graduate School of Education, Harvard University,
New England Education Data Systems; Newton
School Department.

Funding Agency: U. S. Office of Education under the provisions of
Section 4 (c) of the Vocational Education Act
of 1963.

Duration: 1 June 1966 - 30 June 1969.

Objectives (General):

The overall objective of this project is to develop the prototype of an information system which with repeated application could ultimately improve the career decision-making of all persons, particularly students who are or ought to be in an attitude of vocational choice. This will require providing comprehensive, accurate, and relevant data at appropriate choice points in the educational and vocational sequences they may elect. It will also require providing these persons with instruction and supervised practice in the making of vocational decisions, and hence in understanding how their use of

data through decisions in turn creates information of value to them. The content of the system will include current and projected data on education, training, and job characteristics and personal data about the user. Also required will be computer routines that will connect the user to the data in terms of his personal characteristics. Other goals include study of the relationship of economic deprivation to "sense of agency;" the effectiveness of accurate data turned into information in generating such a sense where it is lacking; and the placement of the System into an existing vocational education program so that evaluation and revision of both program and system may occur. Eventually, this project could assist persons in the New England area to make better choices about the education, training, and retraining which they elect, with potential benefit both to the individual and the region.

In general, the project must engage in intensive and extensive work to enable the System to bring into anyone's awareness the following four elements which are important in purposeful decision-making:

1. Accurate and comprehensive information about alternatives and consequences.
2. A "sense of agency" -- a functioning belief by the person that he can choose and thereby become a determining agent in the course of his career, and that he assumes personal responsibility for the consequences of choice.
3. Knowledge about the process of decision-making and the psychology of career choice as well as the relation of decision to action.

4. Knowledge about his own idiosyncratic value system
and its consequences for his decision-making.

Each of these elements may be considered a necessary but not sufficient condition for purposeful decision-making. Accurate, comprehensive, and relevant data are needed to reduce the limiting effects of chance in the decision-making process. Data turned into information is the content of decision making and the quality of decisions is ordinarily directly related to the quality and comprehensiveness of the information possessed by the decision maker. Even the most purposeful person is limited in a decision by the lack of complete information. However, with machine data processing, we now have the capability to make data turned into information more comprehensive. It remains for us to make this more comprehensive information useful, and to assess its effect on the individual.

Objectives (Specific):

This project falls naturally into three broad areas, each of which depends for its successful execution on the other two. Each area actually consists of two closely related sub-areas, as follows:

- A. Development of a computer-based data system for use in vocational decision-making:
 - 1. Collection of data on education, training, and job characteristics, and on the persons who will use the system (these data may initially be only first approximations to the kind eventually developed).
 - 2. Development of computer routines (computer programs) and utilization or adaptation of display devices (audio, video, tape, cartoon, film, etc.) which will connect the user, in terms of his personal characteristics, directly with the data so that he can generate information for his use in vocational decision-making.

- B. Development of a training program, or course, in vocational decision-making:
 - 1. Specification and provision of the elements and process of decision-making for individuals of various ages and vocational situations.
 - 2. Supervised practice in decision-making for students and counselors, using the data and routines described in (A) above.
- C. Study and assessment of the system, its users, and its use:
 - 1. Assessment of the decision-making process, yielding clues about both the quality of the data involved and its use by students.
 - 2. Study and analysis of student characteristics and their relationship to such things as vocational decision-making, occupational choice, and performance in education, training, or work.

The specific objectives for each of the areas are as follows:

- A. Development of a computer-based system for use in vocational decision-making.

Part 1. Description of occupations prevalent in a region of New England in terms of requisite skills.

- a. To make information about occupations readily available to students.
- b. To organize this material in such a way that the student can relate it to his vocational decision process.
- c. To characterize occupational information in terms of skills so that it becomes meaningful to talk about specific abilities and interests in relation to specific occupations.

Occupational forecasting and prediction of manpower needs and occupational patterns for a region of New England.

- a. To more accurately assess the future occupational demands throughout a region of New England.
- b. To better determine the present occupation pattern for the selected New England region and to relate this to predicted future patterns in terms of manpower shifts, new skills, and needed curriculum development.
- c. To assess the role that forecasts can play in vocational guidance and in career decision-making.
- d. To better determine the relationship between future occupational demands and present vocational curricula.

Part 2. Development of a computerized system which becomes an integrating medium for the synthesis and the presentation of vocational information. In order to make these resources immediately available to students, it will be necessary to:

- a. Develop computer programs for information retrieval, processing, and display.
- b. Develop facilities for direct communications (via consoles) with the computer for counselors and for students in decision-making course.
- c. Establish a "media-room" where students may have access to computer-controlled slide, tape, and television display of vocational information at their convenience.
- d. Develop programs for the automated analysis of vocational literature.

- e. Explore the applicability of computer-based instruction methods of presentation of occupational information.
- f. Examine experimental computer system presently in use at Palo Alto School System.

B. Development of a training program, or course, in vocational decision-making.

Part 1. Specification and provision of the elements and process of decision-making.

- a. To provide the student with an understanding of career as a time-extended set of choices which requires that well-considered decisions be made periodically with reconsideration of prior decisions at each new decision-point.
- b. To familiarize the student with the myriad forces-external and internal, cultural and material - which operate upon his career decisions.
- c. To enhance the student's awareness and assessment of his own abilities and interests especially as they relate to vocational decisions.
- d. To develop a sense of agency in the student.
- e. To develop the student's ability to digest and interpret occupational information.
- f. To establish in the student's decision process the proper use of such things as probability statements, projections, and expectancy tables.

Part 2. Supervised practice by counselors of students engaged in vocational decision-making.

- a. To assist while requiring the student to engage in the decision-making process in selecting the path of his own career.

C. Study and assessment of the System, its users, and its use

Part 1. Development of a measurement system to assess student characteristics relevant to vocational decision-making. Instruments will be selected or designed to assess such things as:

- a. Vocational self-concept
- b. Sense of agency
- c. Work values
- d. Occupational constructs
- e. Vocational planning readiness
- f. Occupational interests
- g. Skills potential
- h. Aptitudes

Part 2. Longitudinal studies of the relationship between

- 1) student characteristics and occupational choice,
 - 2) performance in school and success in junior college, post-secondary schooling, or the world of work.
- a. To determine the occupational groups a given student most resembles.
 - b. To estimate the degree of success a given student is likely to have in particular occupational fields.

- c. To relate a given student's experience and plans to those of the students who have gone before him.

Procedures: Procedures are not yet completely developed. However, progress has been made at two levels:

1. Preliminary specification

- A. Understandings needed for prevention of claim that System determines lives (See Appendix A, attached).
- B. Preliminary specifications for data and routines (See Appendix B, attached).
- C. Procedures for implementing the making of vocational decisions (See Appendix C, attached).

II. Rudiments of the PERT for the Information System (See Appendix D, attached).

Current Status or Progress: Grant has been negotiated effective 1 June 1966.

The rudimentary PERT (Appendix D) presently mirrors the progress and status of the project since its inception as of that date.

NOTE:

Appendixes were not included in this report due to space limitations.

PROJECT SUMMARY

Submitted by: William W. Turnbull, Executive Vice President
Educational Testing Service

Project Director: Thomas L. Hilton, Senior Research Psychologist
Educational Testing Service, Princeton, New Jersey

Title: An Investigation of Intellectual Growth and
Vocational Development

- Objectives: (1) To trace the intellectual development of students who subsequently elect vocational as opposed to college preparatory curricula.
- (2) To investigate the interaction over time of stated vocational plans, individual characteristics, environmental influences, and subsequent occupation.
- (3) To develop a preliminary theoretical model of vocational development.

Procedures. A five-year longitudinal investigation of the vocational orientation and preparation of American youth is proposed. Support is requested for the first two years of the study (Phase 1) with the expectation that support later will be requested for Phase 2. This investigation will make extensive use of the data of the Study of Academic Prediction and Growth, a ten-year longitudinal study initiated at ETS five years ago. The Growth Study, sponsored by ETS and the College Entrance Examination Board, involves some 40,000 students in 17 U. S. public school systems and six independent schools. In 1961 and again in 1963, the students were given a compre-

hensive battery of objective aptitude and achievement tests and in 1963 they completed a 25-page background and experience questionnaire. A third nation-wide testing and questionnaire administration will take place in the fall of 1965 and a fourth in the fall of 1967.

The investigation proposed here will focus on how students' attributes interact with environmental variables to result in certain students' electing to prepare for a vocation and in others' electing to prepare for higher education; and on how this choice influences the students' educational development. To supplement the several batteries of test data available for each student from the Growth Study itself, a variety of special questionnaires will be given, ending with a follow-up questionnaire one and a half years after he graduates from high school. The funds requested will be used primarily for (1) data analysis and (2) obtaining the additional interview and questionnaire data required.

Time Schedule: January 1, 1966 to December 31, 1967

QUARTERLY PROGRESS REPORT

April 1, 1966 to June 30, 1966

A Study of Intellectual Growth and Vocational Development

Grant Number: OEG-1-6-06183-0650

Educational Testing Service

Princeton, N. J. 08540

July 1, 1966

1. Description of Work Completed

a. Administrative

During the initial period of work on the Study of Intellectual Growth and Vocational Development, the major emphasis has been on staffing and detailed planning. To assist the ETS staff members who are mentioned in the original proposal, three additional ETS staff members with experience in the area of guidance research have been asked to devote part of their time to the Study. They are, Norman E. Freeberg, Research Psychologist; Gerald Halpern, Research Psychologist; and Donald A. Reck, Research Psychologist. The investigations to be conducted by these staff members will be described shortly.

Thomas B. Sprecher, Research Psychologist, who was mentioned in the original proposal subsequently has resigned from his position at ETS; and Sandra Cohen, Associate Research Psychologist, is devoting full time to a major study for the National Institute of Child Health and Human Development. Marion W. Tyson, Administrative Assistant, will be responsible for all administrative matters connected with the Study; Lynn K. Gaines and Lenora E. Segal will continue as Research Assistants.

In addition, Barbara Rothenberg and William Godwin, who are in the final stages of completing their doctoral work at Cornell University and the University of Indiana respectively, were asked to join the staff of the Developmental Research Division at ETS with the expectation that they would devote a major part of their time to this study. Each will join the staff in July and their role will be discussed in the report for the next period.

Part of this planning stage has involved the development of a flow chart depicting the major steps which must be taken to complete the project. A copy of this chart is attached. As the planning for the project continues this chart will become considerably more elaborate.

b. Research

The total project is being implemented as a series of closely related but separate smaller studies, each under the direction of an experienced staff member. The first of these, designated by the ETS project number 870-2, is entitled The Case Development Interview Technique and is under the direction of Gerald Halpern. A team of researchers will visit a sample of the 17 Growth Study school systems to obtain information concerning their vocational programs and the way in which students select a particular curriculum as an initial step in career planning. Interviews will be conducted for small samples of students at selected schools to determine the status of their vocational planning. The instrument resulting from this study will then be used for larger samples to describe the curriculum choice processes.

Project 870-3, The Follow-Up Study, is planned as a questionnaire survey of vocational and educational involvements. In the Fall of 1966 there will be a second follow-up (the first having been conducted within the Growth Study) of a ten percent sample of the seniors tested in the Spring of 1965 (Growth Study Group 2 subjects) and in June of 1967 a first follow-up of the seniors tested in the Spring of 1967 (Growth Study Group 3 subjects). The size of the sample of 1965 graduates has been doubled over the five percent originally specified. Preliminary estimates of probable returns and usable responses indicate that a five percent sample would not produce numbers large enough for the analyses tentatively planned.

Project 840-4, The Background and Experience Questionnaire Analysis and Development, will involve the development of scoring keys for the Background and Experience Questionnaire (BEQ) for measures of non-school experiences likely to be relevant to school performance and vocational development.

Project 870-5, Simulation of Curriculum Assignment Process. In this Study, under the direction of T. L. Hilton, an effort is being made to develop a series of decision rules which will simulate the process by which students become identified with certain high school academic courses. First indications, based on a pilot case study at one Growth Study school, are that at least six groups are involved in this process: teachers, members of the guidance staff, administrative officers, parents, the students themselves, and their peers. The sequential decision-making takes place over a period spanning at least six years. The major curriculum assignments--some of which

are made by the students themselves and these are "self-assignments"-- are made at the ninth grade level, but these appear to be highly influenced by ability groupings which originate in certain judgments made by sixth grade teachers.

2. Plans for Next Reporting Period

In the next time period the research will proceed in accordance with the plan which is shown on the appended diagram. The Vocational Planning Interview Schedule will be completed; the factor structure of the BEQ will be compared across administrations; the Case Development Interview will be perfected; a preliminary model of the curriculum assignment process will be completed; and the follow-up questionnaire and procedures for conducting the follow-up will be refined. No major departures from the proposed research are expected nor problems which have not been anticipated.

PROJECT SUMMARY

Title: The Development and Evaluation of a Pilot Computer Assisted Vocational Guidance Program

Principal Investigator: Joseph T. Impellitteri
Assistant Professor of Vocational Education

Institution: The Pennsylvania State University

Funding Agency: Pennsylvania Department of Public Instruction

Duration: January 1, 1966 to April 30, 1968

- Objectives:
1. To develop a computerized system which will present selected occupational information to ninth grade boys via slide projections, tape recordings and computer terminal printouts.
 2. To evaluate the effectiveness of the system in aiding ninth grade boys to explore occupational opportunities.
 3. To provide a model for an expanded future system which may include a much greater number of occupations from the unskilled to the professional.

Procedures: System Development

1. The Hardware - IBM 1050 terminals with slide and tape capacity tied into an IBM 1410 computer. The coursewriter language, developed by IBM, is being used.
2. The Occupational Information
 - a. Eighty (80) representative trade and technical occupations have been selected for presentation.
 - b. Descriptions of the 80 occupations have been collected from commercial concerns, federal and state educational and labor departments, industries and labor unions.

- c. Color photographs of actual workers in the 80 occupations will be taken.
- d. Interviews will be conducted with actual workers in 80 occupations.
- e. A format for essential information has been devised. The total amount of information will be abstracted and written to fit the format.
- f. Twenty minute interviews with workers must be edited to two minutes.
- g. The total amount of time allowed to present each occupational description is 7 - 8 minutes.
- 3. The Operational Sequence - See Figure 1, next page.

NOTE: Computer selects suitable occupations on the basis of students' aptitudes as measured by the GATB and their answers to a series of questions.

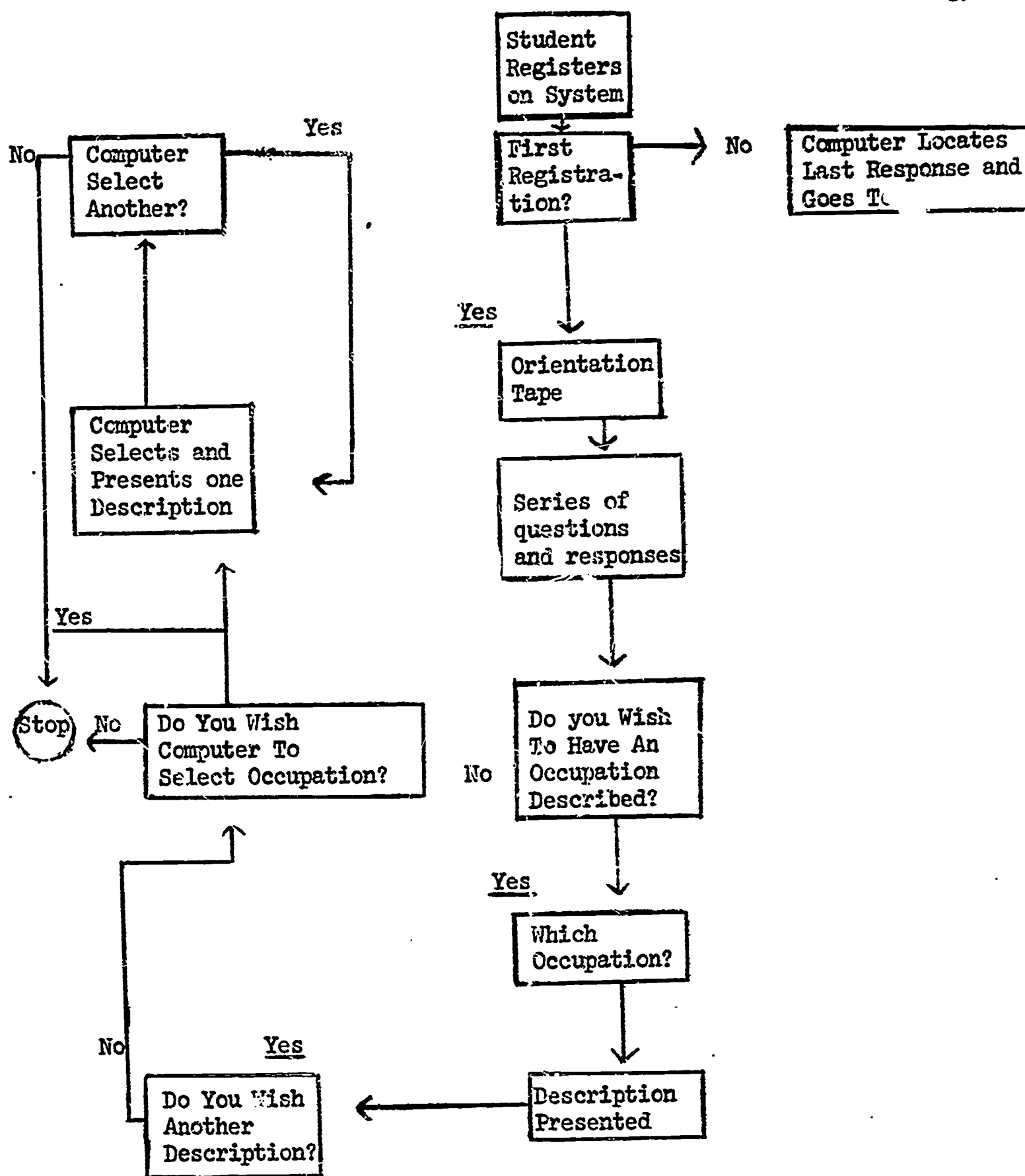


Figure 1: Operational sequence of the system.

- Evaluation
1. Of equipment: A reaction inventory to the equipment will be administered after the students have completed the program.
 2. Of the effectiveness of the system: Prior to, immediately following and six months after the students have had contact with the system, the following measures will be administered:
 - a. An occupation information achievement test
(based on the stored information)
 - b. A career decision-making test
 - c. A self-concept inventory
 - d. A scale of values

The design which will be utilized in analyzing the data collected above is presented in Figure 2.

Current Status or Progress: The computer program has been completed, and ten occupational descriptions have been entered. Three-fourths of the interviewing and photographing have been completed, as well as the total number of occupational descriptions. Editing of tapes, and abstracting of literature is now going on.

A brief time schedule for the project is presented below:

1. Complete development of the system - 1/1/67.
2. Field trial of the system - 1/1/67 to 4/30/67.
3. Revision of the system - 5/1/67 to 8/31/67.
4. Final field trial and evaluation - 9/1/67 to 4/30/68.

| EXPERIMENTAL | | CONTROL | |
|--|--|---|---|
| (Computer System) | | (No Computer System) | |
| Treatment Group #1 n = 50 Arrangements made with counselor after each 30 - 45 minute session at computer terminal. | Treatment Group #2 n = 50 Counselor available if requested by student at any time. | Treatment Group #3 n = 50 Group session with counselor each week. | Treatment Group #4 n = 50 No counseling provided. |
| | | N = 200 ninth grade males | |

Figure 2: The Design for Evaluation.

Title: Vocational Problem-Solving Experiences for Stimulating Career
Exploration and Interest: Phase II

Principal Investigator: John D. Krumboltz
Associate Professor of Education and Psychology

Institution: Stanford University

Funding Agency: U.S. Office of Education

Duration: June 1, 1965 - November 30, 1966

Objectives: In an effort to improve ways of motivating young people to explore their own career opportunities and see the world of work as a set of intriguing and enjoyable problems, it is proposed that modifications in the structure and use of the life-like occupational problem-solving kits developed in Phase I of this project be tested. The general purpose of Phase II is to test alternative ways of constructing and using problem-solving materials. Specific ways of tailoring occupational problem-solving materials to the preferences, interests and abilities of individuals will be tested in the Phase II continuation:

1. To determine the optimal difficulty level of the occupational problems for students with varying interests and ability levels.
2. To determine the effect of adding specific questions for students to explore after problem-solving.
3. To determine the effect of giving students their choice of problem-solving kits.
4. To determine the effect of assuring students an opportunity to make use of the information to be sought.

Procedures: Three additional occupational problem-solving kits will be constructed in Phase II making a total of eight available for experimentation. Criterion instruments will assess the degree of vocational exploratory behavior and career interest among tenth grade non-college bound males.

The first experiment will present three problem-solving kits, each of which is constructed so that success in solving the problem is hard, moderately hard, or easy to attain. Analysis will be made of the effect of each difficulty level on subjects at each of three ability levels and having each of six initial types of vocational interest.

In the second experiment a random half of the subjects will be allowed to work on the two problem-solving kits of their first choice and half will be given the same two kits but picked from among those not listed as their first choice. A random half of each of these choice and no-choice groups will then each be given a list of specific questions comparing the two occupations while the other half receive more general questions. Finally, a random half of subjects who receive each type of question will make appointments with a counselor to report their reactions and findings, while the other half will not make such appointments. All subjects will have the counseling interview but only half will know of the appointment in advance. The analysis will determine the relative effect of each factor and possible interactions on the extent of vocational exploration and career interest.

PROJECT SUMMARY

Title: Clear Language Print-out of Demographic & Psychometric Data
Regarding College Students

Principal Investigator: Thomas Magoon

Institution: University of Maryland - Counseling Center

Funding Agency: Above

Duration: Indefinite

Objectives: To make available to counselors, readily and concisely, the array of demographic and psychometric data which we annually gather about individual college students.

Procedures: This project has been developed with the expectation of having remote station retrieval on demand with the advent of IBM 360 type equipment in the University's Counseling Center. Our data are programed for clear language print-outs and these are now run weekly for use with clients who have had intake interviews and are about to start counseling.

Status: Now operative containing demographic census data. Available for all students counseled at Center. Program now being written to incorporate (a) CPI scores and profile, (b) ACT scores and profile, (c) Holland VPI scores and profiles, (d) each semester's GPA.

Title: Educational Information Transmission Via Message Repeater Tape
(Single messages)

Principal Investigator: Thomas Magoon

Institution: University of Maryland - Counseling Center

Funding Agency: Above

Duration: Indefinite

Objectives: To present information economically, articulately, uniformly in on-demand schedule of users; by doing so with content ordinarily transmitted by counselor, considerable saving in professional manpower time is effected.

Procedures: Develop audio message repeater tapes for (a) intake of clients into Reading and Study Skills Laboratory program (educational skills development); (b) preparing students after intake interviews for participation in effective problem solving counseling (see first project report); (c) and for orientating students, both clients and non-clients, to use of occupational information in their vocational planning.

Current Status and Progress: Three message repeater tapes are now operative in our Counseling Center. They are used in the reception area with headsets. They are self operative by users and range from eight to fourteen minutes in length each. The repeater tapes are used on ordinary tape recorders. No problems have developed to date except when occasional helpful listeners try to rewind the tape!

Title: Educational Information Transmission via Multiple Message Repeater
Tapes

Principal Investigator: Thomas Magoon

Institution: University of Maryland - Counseling Center

Funding Agency: Above

Duration: Indefinite

Objectives: To present varied information economically to users in an on-demand schedule, when and where most usage will occur; by doing so user is exposed to information much of which will practically be unavailable to him otherwise.

Procedures: Originally the Juke Box was the instrument believed to provide this economical random access response capability. One was acquired and several adaptations made to improve its utility. It has proven to be too cumbersome to be mobile, but more important are the following limitations: (a) cost of recording records and (b) the limited playing time per record. Currently we have on order a 23 track tape mechanism that has as much or more response capability as the Juke Box would, it is light weight (7 lbs.) and runs on batteries as well as through outlet current.

Current Status and Progress: To record in Fall, 1966, 15 minute semi-structured interviews with representatives of each academic major within the University (up to 95 majors). Material is then to be placed in varied settings and usage and user reactions gathered. This same equipment clearly usable for (a) vocational information and (b) social modeling presentations for prospective

and present clients in individual and/or group counseling. Shortly there is to be a visual component available for the above equipment and this raises questions as to what kinds (if any), of these audio-stimuli will be enhanced by visuals as well.

Title: An Effective Problem Solving Model for Educational-Vocational Planning

Principal Investigator: Thomas Magoon

Institution: University of Maryland - Counseling Center

Funding Agency: Above

Duration: Indefinite

Objectives: To develop a self-directed model approximating vocational counseling but offering more thorough treatment and allowing use with multiple individuals at one time, and done largely through written communication.

Procedures: To define and teach steps in problem solving and then enable the client to apply the process to the problem of his own indecision. There are 12 parts to the material and the client works on these one at a time and following these the counselor makes additional written and/or oral comments facilitating the client's work. The parts include study methods and efficiency, ability and achievement, interests, work experience, leisure experience, expectations of significant others, etc. These are followed by an integration section and then a taking action on plans section and conclude with a client evaluation.

Current Status and Progress: This model is now operative at the Counseling Center and in the University's Pre-College Summer Session Program. The material has gone through six revisions and our experience suggests the treatment offers more thorough counseling, lends itself to very varied usage by counselors

and clients. Clients indicate finding it as much or more value to them than "traditional" counseling. Problems of most prominence at present involve how to introduce more incentives, hence making the stimulating material more powerful, and consideration of other variations in usage and development of content in other problem areas.

PROJECT SUMMARY

Title: A Multi-Media Approach for Communicating Occupational
Information to Noncollege Youth

Principal Investigator: Ann M. Martin

Institution: University of Pittsburgh

Funding Agency: U. S. Office of Education under the Provisions
of Section 4 (c) of the Vocational Education
Act of 1963

Duration: October 1, 1965 - November 30, 1967

Objectives:

- 1) To design and develop materials and procedures needed to convey information on the important aspects of education and work in today's world. These materials will be designed to teach the basic planning skills of self-estimation and educational and vocational decision-making to 8th and 12th grade students. The materials will be designed specifically for guidance of non-college youth.
- 2) To design and develop displays of opportunities for specialized study and work in local regions.
- 3) To develop a program to train educational personnel to use these materials in the guidance of noncollege youth.
- 4) To evaluate the impact of the system of materials and procedures for their use on student attitudes, understandings, career plans, and educational and vocational choices.
- 5) To provide for additional refinement and development of the system of materials as it operates in actual practice.

- 6) To contribute to theory and practice in vocational guidance through a scientific and systematic approach to the problem of effective means of communicating occupational information.

Procedures: The project will extend for three years. A working conference was held during the first year of the project to assist in summarizing the present "state of the art" of vocational guidance for secondary school students. It focused on questions, methods, tools, and information called for to meet the needs of noncollege bound youth.

The project will be conducted in three phases. The basic work program will include the following:

- 1) Setting of specifications for development of instructional and informational materials desired.
- 2) Design, development, production, and tryouts of these materials.
- 3) General evaluation of effectiveness of the program in experimental schools.

It is not possible to specify in detail the exact materials to be produced for the project in advance of the development of specifications based on a theoretical model. However, the following types of materials may be expected to result from project work:

- 1) TV program series (Videotape and/or kinescopes introducing vocational counseling and related problems and approaches to teachers and guidance personnel).
- 2) Small library of 8 mm. single concept films (2-5 minute loop films stored in cassettes) which can serve as a kind of visual glossary to explain specific occupational activities and information, with special attention given to those occupations or problems which are most frequently misunderstood.

- 3) Collection of overlay transparencies and 2" X 2" slide sets for use in general presentations to groups and for individual review of that occupational information material, which can, through use of transparencies of various sizes and types (including 16 and 35 mm filmstrips), introduce useful material.
- 4) Study booklets (with a number developed in programmed instructional formats) for the introduction or review of selected areas--useful to introduce a field and/or to expose a student or counselor to the nature of substantive content requirements in the field. A unique feature of the programmed materials will be the development of a personal-assessment programmed text or counsel-aid to assure more complete involvement of the student with occupational information and vocational choice.
- 5) Teacher's guides to offer recommendations concerning ways in which the materials produced may be used singly and/or in combination.

In a general way, materials to be produced (for the project) will be mutually reinforcing and will be recommended for use in a definite over-lapping sequence, functioning as a "system" of information when fitted properly into counseling procedures.

Answers to the following questions are being sought:

1. How much is it possible to raise the level of educational and vocational planning of secondary school students by use of these materials?
2. Does improved self-estimation from direct training and practice in self-analysis of interests, values, abilities, etc., generalize to the

important decision-making behaviors of educational and vocational choice?

3. What corresponding increase takes place in educational motivation, attitudes, and vocational preparedness?
4. How is the rate of improvement related to environmental or other socioeconomic factors?
5. What are the characteristics of those who demonstrate above average increase in vocational planning skills?

The amount of improvement in vocational planning will be determined from a pre-guidance and post-guidance administration of a basic test battery. The amount of improvement which takes place in educational decision-making will be determined by student follow-up questionnaires and guidance counselor and teacher evaluations. The primary criterion will be the improvement which takes place in the choice of post-high school program or occupational area entered by 12th grade students on graduation and the educational programs entered in the 9th grade by the 8th grade students. Student, school, counselor, teacher, and guidance program background data will be accumulated to determine the effect of various socioeconomic factors upon changes in vocational planning.

Current Status or Progress:

The following is a list of the guidance materials currently produced. These materials serve as illustrations of materials to be developed during the second phase of the project for use in participating experimental schools in the Pittsburgh locale.

I. Guidance Materials Currently Produced

A. Slide-Tape Presentation: MAN AT WORK

This prototype on the factory worker had its origins in the theory on work. It is based on a functional job analysis model combined with

concepts of life style and People, Data, Things analysis of work.

The presentation was developed as an example of stimulus materials for group discussion with student and professional audiences.

B. Slide-Tape Presentation: THE DRIFTERS

The format of this slide-tape presentation was developed as a means of exploring the potentials for presenting different kinds of themes and messages with slide-tape sequences. It has proved useful as a demonstration of the use of the filmstrip to raise controversial issues. This presentation was developed as a vehicle for discussion of the "dropout" problem with student and professional audiences.

C. Slide-Tape Presentation: WHO POINTS THE WAY

This was the first film produced by the project. It was conceived as resource material for the conference on Occupational Information and Vocational Guidance. The presentation was developed as a promotional piece to be used with laymen as well as professionals, showing the need for occupational information.

D. Slide-Tape Presentation: THE CLAMDIGGER

This presentation is a development of the "Clamdigger model" as presented originally in the second quarterly report. The basic concepts of "What is a Job" are explored through means of the neutral stimulus of a simple form of work - clamdigging.

The slide-tape presentations described above have been reviewed by members of the project's National Consultant group, staff members and job trainees at the Job Opportunity Training Center, Washington, D. C., and secondary school students at two parochial and two public schools in the Pittsburgh area.

II. Theoretical Developments on which the Guidance Materials will be Based.

A model for communicating occupational information which takes into account the three criteria of Work, Education and Self and includes the concept of levels, from the generic to the interrelated, is undergoing development. The model takes into consideration the question of how to make vocational data meaningful for differing subpopulations and individuals at different stages of occupational choice and the methodology appropriate for the communication. This model will establish the basis on which production efforts will proceed.

III. Research Activities as In-put for Development of Materials.

Data are being gathered, with the assistance of research services of American Institutes for Research, to determine the types of problems "noncollege" high school graduates in differing cultural settings in the Pittsburgh locale face in obtaining jobs. These data will be used to develop empirical objectives for films of work factors for the range of "noncollege" subpopulations identified. The draft films planned for this first phase will consist largely of vignettes featuring the problem faced by "typical" recent graduates by type of school. The vignettes will picture the individual either at work, in a mock-work environment, or in his home as he ordinarily does things and will describe graphically how successful he (or she) was in getting a job, what he (or she) does on the job and how he (or she) feels about the job, future plans, etc.

The data obtained from the Project TALENT Data Bank provides a base of knowledge about present guidance programs in the American secondary schools. Their questionnaire supplies information about the structure of guidance

programs, the function of counselors, and the manner in which students relate to available guidance facilities. The distribution of the questionnaire items by type of school, number of students, percentage of male dropouts, etc. yields a more specific view of the guidance situation. The interpretation of this data will be especially valuable as a point of orientation for the development of media.

A research paper has been developed on Subgroup Differences on Attitudes Toward Work. Findings of the studies reported will be applied in the development of guidance materials. This paper can be obtained from the Project office.

IV. A Workshop on Communicating Occupational Information to Noncollege Youth

A workshop was held at the Hotel Roosevelt, Pittsburgh, August 6 - 14. It was conducted for a sample of schools who will be asked to try out the guidance system of materials to be developed in the course of the project.

The primary focus of the workshop is the problem of conveying information on: (1) occupational awareness (the world of work), (2) career planning (the world of self), and (3) vocational capability (the world of education and training) to noncollege youth. The workshop will concentrate on several areas of educational practice: teaching, administration, guidance, and curriculum planning. Answers to the following questions are being sought:

1. Who are the "noncollege" subpopulations? (Can we identify "noncollege" youth?)
2. What are the "noncollege" occupations? (What are the levels of occupational knowledge required?)

3. What are the methods of communication? (How do we reach these groups? To what do they respond?)
4. What are the various factors to be taken into account in developing guidance materials for the "noncollege" subpopulation?
5. What are the roles of the guidance counselor, teacher, administrator, and curriculum planner with reference to these groups?

PROJECT SUMMARY

Title: Vocational Orientation Systems (VOS)

Principal Investigator: Frank J. Minor
IBM Corporation
Manager, Engineering Psychology Department
Advanced Systems Development Division

Consultants: Dr. Donald E. Super
Dr. Roger A. Myers
Teachers College, Columbia University

Institution: IBM, Advanced Systems Development Division

Funding Agency: Same

Duration: January 1966 - December 1967

Objectives: A computer-based system is being designed to: (1) provide for more effective utilization of occupational information by high school students during their educational-vocational planning process, (2) relieve the counselor of manual information handling tasks associated with the classification, selective retrieval, and storage of occupational information.

The design approach being employed is that of a man-machine system approach which makes an optimum assignment of functions and responsibilities between the counselor, the student, and the machine. More simply, each of these three "components" in the counseling process are assigned those tasks which they are best equipped to handle.

A "counseling model" has been developed which describes the functions to be performed by the system. Students will operate the system in a real-time problem-solving mode. Through learning, the student will reduce the uncertainty of his educational-vocational plans. The student will have an unlimited number of

sessions with VOS on a demand basis. The major functions to be performed by the system are as follows:

1. Test the validity of the student's estimate of his strengths and weaknesses.

This is accomplished by comparing the student's "self-description" with measured results from his scholastic achievement record, aptitude tests and interest inventories.

2. Test the wisdom of vocational aspirations of the student.

This is accomplished by allowing the student to select occupational families to which he aspires and checking for discrepancies with his measured aptitudes, scholastic achievement and interests.

3. Prompt the student to consider occupational families which he has made no mention of, but is qualified for as indicated by his measured aptitudes and interests.

4. Allow student to explore the "nature of work" (duties, educational requirements, environment) for the occupational family to which he aspires.

5. Allow student to analyze and "work" with important occupational information, for a specific occupation within the occupational family. This includes such factors as: competition, salary, variety of duties, creativity, educational requirements, methods of entry, growth prospects, etc.

6. Test the realism and level of specificity of the student's educational-vocational planning for the specific occupations to which he aspires.

- Procedures:
1. A "counseling" model in the form of a block diagram has been postulated which describes the functions to be performed by the systems.
 2. The counseling model is being translated into system requirements, i.e., (I/O equipment, data base, operating procedures).
 3. Field testing and experimentation is planned in order to test the validity of the "counseling" model.

Current Status or Progress: A preliminary version of the system is currently being programmed for demonstration purposes. The demonstration version will be completed this Fall 1966. The computer system employed is the IBM 7010-1440 CAI system, a remote terminal which provides audio, film image projector, and typewriter output capabilities for presenting information to the student. Responses by the student are made by means of an alpha-numeric typewriter keyboard at the terminal.

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